MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

DEE5016 – ELECTRONICS 1

(Diploma in Electronic Engineering)

7 OCTOBER 2022
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 5 pages including the cover page with 4 Questions only.
2. Attempt **ALL** the questions . The distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided .

Question 1

a) List out THREE special purpose diodes. [3 marks]

b) How is Zener diode different from the common semiconductor diode? [5 marks]

c) Draw the I-V characteristic curve of a Zener diode. Label the axis, all the operating regions and the Zener voltage, V_Z clearly. [9 marks]
If the diode is used in *voltage regulation*, at what point/region will it conduct and why? [8 marks]

Question 2

a) In a common base connection as shown in Figure Q2(a) below, $\alpha = 0.95$. The voltage drop across the 2kΩ resistor which is connected to the collector is 2V. Determine the base current, I_B. [10 marks]

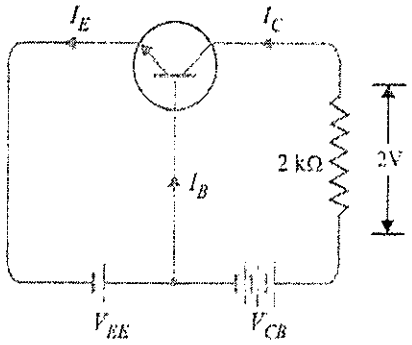

Figure Q2(a)

b) Determine the V_{CB} in the transistor circuit in Figure Q2(b). Assume Si transistor with $\beta = 150$. [10 marks]

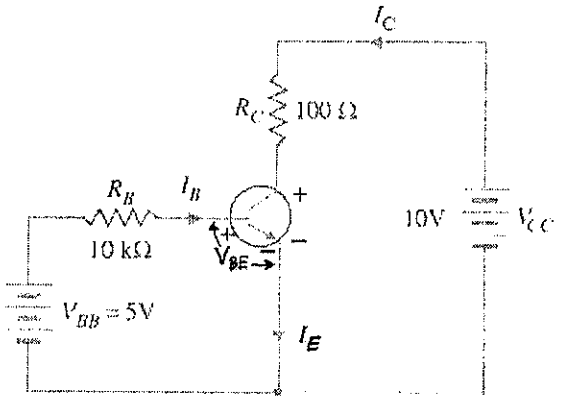

Figure Q2(b)

Continued...

c) Draw the DC load line for the circuit shown in Figure Q2(c). [5 marks]

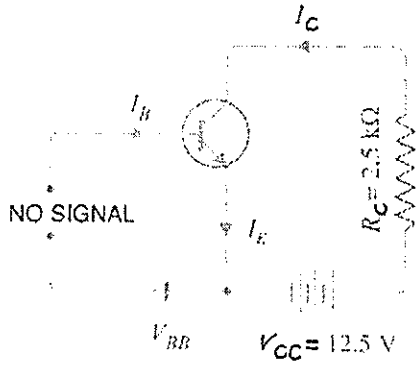

Figure Q2(c)

Question 3

a) For a BJT circuit in Figure Q3(a), determine the *mode of configuration* and the value of I_B, I_C, V_E and R_c if $V_{CE} = 8$V and $\beta = 60$. [13 marks]

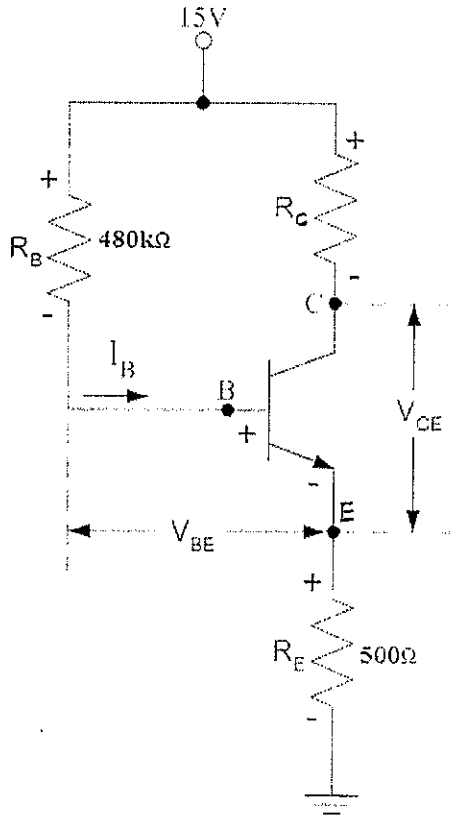

Figure Q3(a)

Continued...

b) A common-emitter BJT circuit as shown in Figure Q3(b) has the following parameters: $V_{BB} = 4V$, $R_B = 220k\Omega$, $R_C = 2k\Omega$, $V_{CC} = 10V$, $V_{BE(on)} = 0.7V$ and $\beta = 200$. Determine

i) the base, collector and emitter currents (I_B, I_C and I_E) [9 marks]

ii) V_{CE}. [3 marks]

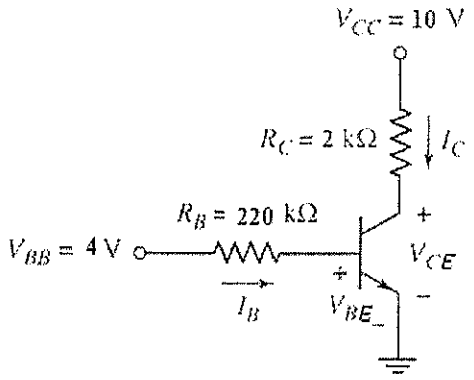

Figure Q3(b)

Continued...

Question 4

Shown in Figure Q4(a) below is a common-emitter amplifier circuit that is known to have the following parameters: $R_S = 2.5k\Omega$, $R_1 = 30k\Omega$, $R_2 = 5k\Omega$, $V_{CC} = 12V$, $R_C = 5k\Omega$, $R_E = 0.3k\Omega$ and $R_L = 10k\Omega$. Assume that the terminal voltage, V_T at room temperature is 26mV, $V_{BE(on)} = 0.7V$ and $\beta = 99$. Neglect any early voltages.

a) Determine the DC base voltage, V_B and DC collector voltage, V_C using the exact method. Prove that the BJT is operating in the *active region*. [17 marks]

b) Sketch the small signal equivalent circuit using the hybrid π model of BJT and then solve for g_m and r_π. [4+4 marks]

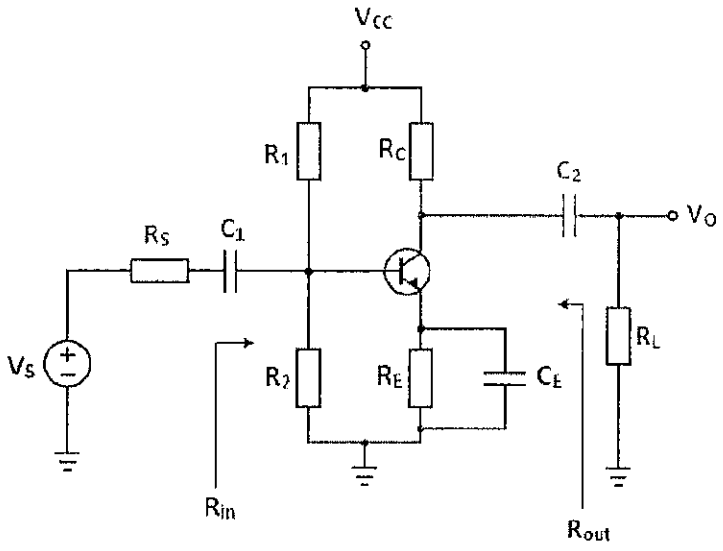

Figure Q4(a)

End of page